



▼ The Activity

Provide students with copies of *Maps A, B, and C*. Explain that they represent aerial views of a watershed taken at different times. To simplify map interpretation, the borders of the watershed coincide with the edges of the grid. In addition, the outlines of various land areas (e.g., wetlands, forests) align with grid lines.

Following are three options for interpreting changes in the watershed presented on the maps. The first option may be more appropriate for younger students, but can help all students complete **Options 2 and 3**. Students should be able to multiply and calculate percentages to complete the second and third options.

Option 1

1. Tell students to look at *Maps A, B, and C*. Explain that they represent changes in this land over a 100-year period. Have students look at the key for each map. Instruct them to designate each land area with a different color (e.g., color all forest areas green). They should use the same color scheme for all maps.

2. When students finish coloring, have them compare the sizes of the different areas on each map and among maps. Ask them to compare plant cover and land use practices in each of these periods. They may note changes in croplands, forests, grasslands, wetlands, urban land uses, etc.

3. Discuss one or more of the following questions:

- What happens to the amount of forested land as you go from *Map A* to *Map C*?
- Which map has the most land devoted to human settlements?
- Where are most of the human settlements located?
- What effect might these human

settlements have on the watershed?

- Would you have handled development differently?

Option 2

1. Have students determine the land area of each of the maps. Each unit in the grid represents 1 square kilometer; there are 360 square kilometers (or 360,000,000 m²) on each map.

2. For each map, have students determine how much area is occupied by each type of land coverage (e.g., forest, wetland, and farmland). Responses can be guesses or exact calculations. For example, for *Map A*, 17 of the grid units are occupied by wetlands. By dividing 17 by the total number of units (360), students should calculate that 4.7% of the land area is wetlands. The amount of land allotted to wetlands, forests, etc. will change for each map, but the amount of stream coverage (111 squares or 30.8%) will remain constant. Students should record their answers in the *Area of Land Coverage* chart.

NOTE: Most watershed calculations employ standard measurements: inches and cubic feet per second

(cfs). However, to facilitate students' computations, metric measurements are used here.

3. Tell students that the watershed has received 5 cm (0.05 m) of rain. (Although rain does not normally fall evenly over a large area, assume that the 5 cm of rain fell evenly over the entire watershed.) By converting both the rainfall and the land area to meters, students can calculate the amount of water (m³) which fell on the land. 18,000,000 m³ of rain fell on the watershed (0.05 m x 360,000,000 m² = 18,000,000 m³). Of this 18,000,000 m³ of rain, 5,550,000 m³ landed on the stream (111,000,000 m² x 0.05 m = 5,550,000 m³). This might seem like a large quantity of water, but if 5 cm of rain did fall evenly on a watershed of this size, the stream would receive this volume of water. (NOTE: 100 cm = 1 m; 1,000,000 m² = 1 km².)

4. Ask students to estimate the amount of water that would be drained from the land into the stream. Tell students that for the watershed represented by *Map A*, 2,767,500 m³ of rain was runoff (i.e., the water flowed into the stream and did not soak into the ground, did not evapo-

ANSWER KEY: AREA OF LAND COVERAGE

	MAP A		MAP B		MAP C	
	100 years ago		50 years ago		Present	
Land coverage	km ²	%	km ²	%	km ²	%
Forest	189	52.5	162	45	111	30.8
Grassland	20	5.6	14	3.9	6	1.7
Wetland	17	4.7	13	3.6	5	1.4
Residential	13	3.6	33	9.2	58	16.1
Agriculture	10	2.8	27	7.5	69	19.2
Stream	111	30.8	111	30.8	111	30.8